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14. ABSTRACT
The primary goal of this program is to provide a flight demonstration of a small low power star camera capable of providing attitude knowledge of 0.02 degree or better. The development of such science-enabling technology is critical for space-flight mission on small spacecraft, such as CubeSats, that cannot afford the mass, power or cost of traditional star trackers but require better pointing knowledge than current small satellite technologies can provide.

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Digital Imaging Star Camera

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LONG-TERM GOALS

The primary goal of this program is to provide a flight demonstration of a small low power star camera capable of providing attitude knowledge of 0.02 degree or better. The development of such science-enabling technology is critical for space-flight mission on small spacecraft, such as CubeSats, that cannot afford the mass, power or cost of traditional star trackers but require better pointing knowledge than current small satellite technologies can provide.

OBJECTIVES

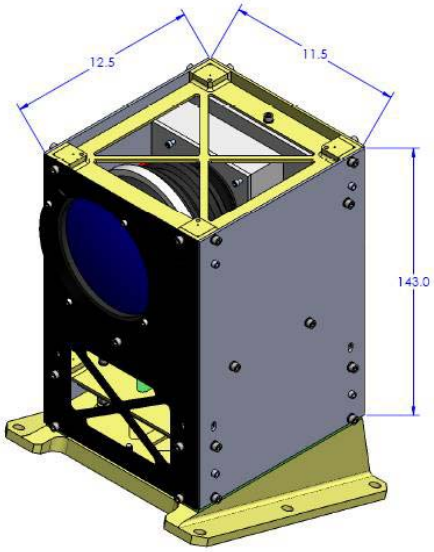
Develop, test and fly a small star camera in space and collect data for performance analysis.

APPROACH

Develop a flight mission concept for the small Digital Imaging Star Camera (DISC) developed under ONR support and present it to the Space Test Program (STP) for access to space. Integrate the star camera onto the flight vehicle and provide a CONOPS for on-orbit operations. Mr. Andrew Nicholas (NRL Code 7669) is the Principal Investigator of the mission and will interface with the STP program. Mr. Ted Finne (NRL Code 7669) is the Systems Engineering Lead for the integration of the Star Camera with the spacecraft. Mr. Mike Freeman (NRL Code 8221) is the Lead Thermal Engineer for heater and blanket design for the mission.

WORK COMPLETED

The program developed a briefing package for the DISC experiment to the STP Space Experiments Review Board. It was selected for inclusion on STP-H3 suite of instruments that have been manifested for flight on the International Space Station. The program has completed its critical design review and passed the NASA level I/II payload safety review. The design is currently being fabricated and is on track for delivery for spacecraft level integration and testing in FY10.



RESULTS

This fiscal year focused on design and parts procurement with expected performance results from bench testing in early FY10 and a flight demonstration in late FY10.

IMPACT/APPLICATIONS

The DISC program will provide proof of concept for miniature low-cost aspect solutions for implementation on nano- and pico-class spacecraft. There is potential transition to fly this type of aspect sensor on a constellation of small satellites designed for space environment sensing.

RELATED PROJECTS

NRL Code 7669 is developing an in-situ sensing suite to measure the density, composition, temperature, and velocity of thermospheric neutrals and ions. The ion drift measurements require a pointing knowledge of 0.02 degrees or better to resolve winds on 5 m/s. The DISC program is capable of providing this level of accuracy from a small satellite.